4 positive results—1 infective fly to 1,260. As tsetse flies and game are about equally numerous at Nawalia and Ngoa, and as the disease was presumably introduced into the two localities, which are less than 70 miles apart, about the same time, it appears to us that the only essential difference which can account for the fact that the percentage of infective "wild" flies at Nawalia is two and a half times as great as at Ngoa is the difference in the climatic conditions. It will be seen from Tables I and II that the temperatures experienced on the Congo-Zambesi watershed during May, June, and July are very much lower than those at Nawalia from September to March. It was during the months named that our experiments were carried out at the two places.

Finally, it might be mentioned that the percentage of infective "wild" flies caught in the valley was greater in the hot than in the cold season. This point is illustrated in Table VII.

TABLE VII.—Percentage of *Glossina morsitans* found Infected with *Trypanosoma rhodesiense* at Nawalia at Different Seasons of the Year.

1911-1912.	Mean External Shade Temperature.	Number of Flies Fed.	Number Infectious with <i>T. rhodesiense</i> .	Ratio Infective to Non-Infective Flies.
June... ..	67.2°	18	0	0:790
July... ..	68.7°	385	0	
August... ..	73.3°	193	0	
September... ..	77.5°	194	0	
October... ..	86.1°	—	—	1:338
November... ..	87.1°	270	1	
December... ..	82.3°	205	0	
January... ..	80.6°	538	2	
February... ..	79.2°	104	0	1:466
March... ..	79.0°	823	2	
April (to 9th)	79.5°	472	1	

In addition to temperature, there is one other factor in the climatic conditions which may possibly influence the developmental cycle of the trypanosome in *Glossina morsitans*. We refer to the relative humidity of the atmosphere. At the most favourable season of the year in the Luangwa Valley for transmission experiments, and also in the case of those carried out in the incubator, the relative humidity was extremely low. Whether this is a mere coincidence we are, at present, unable to form an opinion, but hope to be able to write more definitely on the subject in a later communication.

SUMMARY.

The developmental cycle of *Trypanosoma rhodesiense* in *Glossina morsitans* is, to a marked degree, influenced by the temperature to which the flies are subjected. High temperatures (75–85° F.) favour the development of the parasite, whilst low temperatures (60–70° F.) are unfavourable.

REFERENCES.

- ¹ Kinghorn and Yorke, *Annals Trop. Med. and Parasit.*, vol. vi, 1912. ² *Ibid.*, vol. vi, No. 1 A, 1912.

THE ninth International Physiological Congress will be held at Groningen in September (2nd to 6th), 1913.

UNDER the title, Vienna Roentgen Courses, an association of all the best known radiologists in Vienna, has been formed on the initiative of Herr Keinz Bauer (Engineer), Docent Dr. Holzknacht, and Docent Dr. Kienböck. It is proposed to organize every year a course extending over ten to twelve days, and covering the whole ground of radiology, theoretical and practical. Among the lecturers who have so far consented to take part in the courses are Messrs. Bauer (Berlin), Freund, Haudek, Holzknacht, Kienböck, Robinsohn, Schüller, and Schwartz (Vienna). The first course will be given in the spring of 1913.

THE ETIOLOGY AND TREATMENT OF MINER'S NYSTAGMUS.

WITH A REVIEW OF 100 CASES.

BY

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THE subject of miner's nystagmus as an industrial affection touches the interests of both employer and employee.

The conclusions formed by us as to the causes, predisposing or otherwise, and the treatment, prophylactic as well as curative, have been arrived at by an unbiased and independent consideration of 100 consecutive cases as they presented themselves to us.

The factors contributing to the production of nystagmus in miners are not numerous, and, arranged in order of relative frequency and importance, are: (1) Inadequate light, (2) errors of refraction, (3) straining of ocular muscles, (4) neurotic temperament.

1. *Inadequate Light*.—That this is an important cause of miner's nystagmus is conclusively proved by the fact that 99 per cent. of our cases had been using the lock-lamp for a number of years. Only one case was found where the naked light was allowed, and here the nystagmus was accounted for by hypermetropia, much straining of the ocular muscles in narrow seams, and a markedly neurotic temperament with much physical debility.

The lock-lamp must be 9 ft. from the farthest point of the mandril, and so the workman is staring into comparative darkness, whereas the naked light is attached to the workman's cap or to a post close beside. Therefore, the naked light not only gives a much brighter and stronger light because it is exposed, but also because the workman has its full benefit. We have also had experience of miners in various parts of Scotland, where the naked light is used, and in these districts miner's nystagmus is practically unknown.

2. *Errors of Refraction*.—An examination of the summary of cases of miner's nystagmus seen by us will show that 90 per cent. had errors of refraction, excluding the three cases in which there was evidence of error, but owing to marked photophobia no exact estimate could be made; while 7 per cent. had normal refraction. Of the 90 per cent., 48 per cent. had either myopic, hypermetropic, or mixed astigmatism; 27 per cent. had simple hypermetropia; and 15 per cent. had simple myopia. It is interesting to note that a large number of the cases of hypermetropia were those of comparatively young men who had worked only a few years at coal-cutting.

3. *Straining of the Extrinsic Muscles of the Eyeball*.—This is the result of the two foregoing factors. In all our cases the workman had his eyes fixed in a staring, strained position for long periods, either downwards and laterally, as in narrow seams, or upwards, as in wide seams; 90 per cent. of our cases were engaged cutting coal, while 10 per cent. were hauliers and timbermen, and one a colliery examiner.

4. *Neurotic Temperament*.—The inability, on the part of a very large number of men with nystagmus, to concentrate their physical or mental powers in any particular line of action guides us to the conclusion that such instability is probably much more the cause than the effect of nystagmus. It most certainly appears to be a weak point in the miner's armour, and would repay careful examination long before the stage of inability to work.

The severe headaches and aching eyes of which these men complain are accounted for by errors of refraction and straining of the eyes; the vertigo, by inco-ordination of the ocular muscles; the conjunctivitis and photophobia by the sudden frequent change from darkness into dazzling light.

Prevention.

This resolves itself into medical examination of all men engaged to work underground, and the periodical examination of all underground workers, for (a) the presence of refraction errors, (b) any signs of incipient nystagmus, (c) physical or nervous debility.

To this must be added the importance of adequate light.

Age.	Occupation.	Years Underground.	Refraction.	Oscillation.	Remarks.
43	Miner ...	Over 30 years	Photophobia so marked that refraction examination was impossible	Marked	Vertigo very marked.
48	Miner ...	36 years	+ 0.75 D. sph. in both eyes	Marked	Nictitation and photophobia.
36	Miner ...	24 years	R. -1 D. cyl. horiz. L. - 0.75 D. sph.	Slight	Photophobia.
27	Miner ...	14 years	R. +1 D. L. -2.5 D. sphs.	Marked	Vertigo and photophobia.
24	Miner ...	10 years	R. -2 D. L. -2.75 D. sphs.	Marked	—
56	Miner ...	40 years	R. = Normal. L. + 0.50 D. sph.	Slight	—
29	Miner ...	16 years	R. - 0.50 D. L. -1.50 D. sphs.	Marked	Vertigo frequently.
37	Miner ...	20 years	R. + 0.75 D. L. + 1.25 D. sphs.	Marked	Photophobia.
19	Miner ...	5 years	-2.50 D. horiz. cyl. in both eyes	Marked	—
22	Miner ...	8 years	R. 1.25 D. sph. L. + 1.25 D. sph. -2.75 D. horiz. cyl. -2 D. cyl. axis 120°	Marked	Photophobia and conjunctivitis.
29	Miner ...	3 years	R. - 0.50 horiz. cyl. L. = Normal	Marked	Vertigo.
39	Miner ...	27 years	R. + 0.75 D. L. + 1 D. sphs.	Marked	Photophobia and frequent headaches.
46	Miner ...	30 years	R. + 2 D. L. + 2.75 D. sphs.	Marked	—
21	Miner ...	9 years	Simple hypermetropia + 6 D. in both eyes	Rotatory	Vertigo.
30	Miner ...	18 years	Hypermetropic astigmatism in both eyes	Very slight	Nictitation and vertigo.
46	Miner ...	30 years	Impossible, owing to photophobia	Very marked	—
23	Miner ...	11 years	R. + 2.5 vert. cyl. L. + 0.50 D. sph.	Rotatory	Severe headaches.
35	Miner ...	8 on coal, 4 timberman	Hypermetropic astigmatism in both eyes	Very slight	Vertigo and aching of eyes.
28	Miner ...	13 years	R. + 1.5 D. sph. L. + 1 D. vert. cyl.	Marked	—
41	Miner ...	10 years	R. + 10 D. sph. L. + 10 D. sph. ; 2 D. cyl.	Marked	Nictitation and headache.
43	Miner ...	30 years	Oblique myopic astigmatism -1 D. in both eyes	Marked	—
39	Miner ...	20 years	R. = Normal. L. + 4 D. sph.	Marked rotatory	Has been a haulier for last 10 years.
50	Haulier	40 years	R. -1 D. sph. L. -1.50 D. sph. -0.50 D. cyl. horiz. -0.50 D. cyl. horiz.	Marked	Headache and photophobia.
45	Miner ...	34 years	Mixed astigmatism in both eyes	Not marked	Nictitation and vertigo.
19	Miner ...	5 years	Simple hypermetropia in both eyes	Marked	—
21	Miner ...	9 years	Normal	Marked	Photophobia.
38	Miner ...	20 years	R. = Normal. L. + 2.5 D. sph.	Marked	—
55	Miner ...	40 years	Astigmatism (low degree)	Slight	—
21	Miner ...	8 years	R. + 4 D. sph. L. oblique hypermetropic astigmatism, marked	Marked rotatory	Some photophobia.
32	Timberman	12 years	Oblique hypermetropic astigmatism	Marked	—
48	Miner ...	28 years	+ 2 D. sph. in each eye	Slight	Vertigo and photophobia.
35	Miner ...	22 years	+ 1.50 D. sphs. (both eyes)	Marked	Photophobia.
24	Miner ...	12 years	R. -3 D. cyl. horiz. L. -1.50 D. sph.	Marked	—
37	Miner ...	20 years	+ 1 D. hypermetropic astigmatism (both eyes)	Marked rotatory	—
30	Miner ...	15 years	R. -0.75 D. L. -1 D. sphs.	Slight	Severe headaches.
30	Miner ...	12 years	R. -1.25 D. L. -1 D. sphs.	Marked	Vertigo and photophobia.
48	Miner ...	30 years	R. + 2 D. L. + 2.5 D. sphs.	Slight	Photophobia.
67	Miner all his life	—	Simple myopia, well marked	Marked	Complains of giddiness.
40	Miner ...	20 years	R. + 0.75 D. sph. L. + 0.50 D. sph.	Slight	—
43	Miner ...	25 years	R. + 0.75 D. vert. cyl. L. + 0.50 D. vert. cyl.	Rotatory	Marked headache and vertigo.
39	Miner ...	10 years	R. + 1.25 D. L. + 0.50 D. sphs.	Marked	Photophobia.
33	Miner ...	20 years	Simple myopia. -3 D. in both eyes	Rotatory	Photophobia.
23	Labourer	11 months	R. + 4 D. vert. cyl. L. + 4.50 D. vert. cyl.	Slight	Photophobia.
43	Miner ...	25 years	R. + 0.25 D. sph. L. + 0.50 D. vert. cyl.	Slight	Headaches and vertigo.
26	Miner ...	8 on coal, 1 labouring	R. + 0.50 D. sph. L. + 0.50 D. sph. -3 D. horiz. cyl. -1 D. horiz. cyl.	Marked	No nystagmus when left coal cutting.
24	Miner ...	11 years	R. - 0.75 D. cyl. axis 120° L. - 0.5 D. sph	Marked	Marked quivering of eyelids.
38	Miner ...	25 years	R. + 0.75 D. vert. cyl. L. + 1 D. vert. cyl.	Marked	Marked photophobia.
21	Miner ...	8 years	R. + 1 D. cyl. axis 75° L. + 0.75 cyl. axis vert.	Slight	Vertigo occasionally.
32	Colliery examiner	15 years previously on coal	Slight hypermetropia in both eyes + 0.50 D.	Marked	Pain in eyeballs and vertigo.
45	Timberman	20 years coal; timberman 10 years	R. + 0.75 D. horiz. cyl. L. + 1.25 D. sph. -2.25 D. horiz. cyl.	Not marked	Conjunctivitis and photophobia.

Age.	Occupation.	Years Underground.	Refraction.	Oscillation.	Remarks.
35	Miner ...	Coal 20 years	R.-1 D. horiz. cyl. L.-6 D. sph.	Slight	—
36	Miner ...	Over 20 years	Oblique myopic astigmatism	Marked	Quivering of eyelids and headache.
20	Miner ...	5 years	Hypermetropic astigmatism +1 D. in both eyes	Marked on stooping	Frequent headaches.
34	Miner ...	17 years	R.+2 D. horiz. cyl. L.+2.50 horiz. cyl.	Fine oscillation	Worked as timberman for past 10 months.
35	Miner ...	Over 20 years	Simple myopia. R.-3.5 D. L.-3 D.	Marked	Very marked when in stooping position.
34	Miner ...	20 years	Simple hypermetropia. R.+2 D. L.+4 D.	Marked	Frequent attacks of giddiness.
44	Miner ...	33 years	R.-1.50 D. sph. L.-2.50 D. sph.	Slight	Vertigo.
18	Miner ...	2 years	R.-2.75 D. sph. L.-5.50 D. sph. -1.75 D. horiz. cyl. -3.50 D. horiz. cyl.	Slight	Vertigo. (Has worn glasses for some time)
41	Miner ...	29 years	Refraction normal	Marked rotatory	—
34	Miner ...	25 years	R.-2.50 cyl. L.+0.50 sph. C.-3 D. cyl.	Very marked	—
27	Miner ...	13 years	R. Myopic astigmatism. L. Hypermetropic astigmatism (both of low degree)	Fine oscillation	Marked photophobia and vertigo.
22	Miner ...	10 years	R.+7 D. L.+6.50 D. sphs.	Rotatory	Photophobia and conjunctivitis.
29	Miner ...	17 years	No refraction error	Marked	Conjunctivitis.
45	Miner ...	38 years	R.+2.5 D. L.+2 D. sphs.	Marked	Worked last seven years with naked light.
51	Miner ...	40 years	R. and L.+0.50 sphs.	Marked	—
18	Miner ...	5 years	Mixed astigmatism in both eyes	Marked	Vertigo.
52	Miner ...	30 years	R. and L.+2 D. sphs.	Marked	Conjunctivitis and photophobia.
33	Miner ...	20 years	R. and L.+1.5 D. sphs.	Slight	Marked photophobia.
25	Miner ...	11 years	R.-6 D. sphs. L.-7 D. sphs.	Slight	Marked photophobia and quivering eyelids.
40	Haulier ...	25 years on coal, 5 years haulier	Unable to complete refraction examination owing to patient becoming sick	Rotatory	Headache and vertigo frequent.
38	Miner ...	15 years	R. hypermetropic astigmatism vertical. L. hypermetropic oblique	Slight	Vertigo marked.
33	Miner ...	22 years	Hypermetropic astigmatism in both eyes	Rotatory	—
47	Miner ...	30 years	Hypermetropia in both eyes	Marked on stooping	Nictitation.
23	Miner ...	8 years	Oblique hypermetropic astigmatism in both eyes	Oblique	Photophobia.
35	Miner ...	17 years	R.-0.50 D. L.-1.50 D. sphs.	Slight	Nictitation and photophobia.
24	Miner ...	10 years	R.+0.50 D. with slight myopic astigmatism. L. refraction normal	Rotatory	—
25	Miner ...	13 years	+0.75 D. sphs. in both eyes	Slight	Marked photophobia.
38	Miner ...	26 years	R.-1.5 D. L.-2 D. sphs.	Marked	—
41	Miner ...	27 years	-1.75 D. sphs. R. and L.	Marked	Nictitation, vertigo, and conjunctivitis.
25	Miner ...	12 years	Refraction normal	Slight	Severe headaches.
24	Miner ...	12 years	R.-2 D. cyl. horiz. L.-2 D. cyl. axis 120°	Slight	Marked nictitation.
53	Miner ...	40 years	R. and L.+0.50 vert. cyls.	Slight	Headache and vertigo.
39	Miner ...	27 years	Myopic astigmatism in both eyes	Marked	Retinoscopy almost impossible because of photophobia.
18	Miner ...	5 years	Normal	Slight	Nictitation and photophobia.
21	Miner ...	6 years	Simple hypermetropia in both eyes	Slight	Photophobia.
32	Miner ...	10 years	R.+1.5 D. sph. L.+1 D. obliq. cyl.	Slight	Marked conjunctivitis.
27	Miner ...	7 years	Oblique hypermetropic astigmatism in both eyes	Marked	Severe headaches with photophobia.
34	Timberman ...	20 years	Simple myopia in both eyes	Marked	Severe headaches.
22	Miner ...	8 years	Normal	Slight.	Vertigo.
38	Miner ...	20 years	R.+1.5 D. sph. L.+1 D. sph.+1.5 D. cyl.	Marked	Headache and photophobia.
41	Miner ...	25 years	Simple hypermetropia in both eyes	Marked	Conjunctivitis, marked.
34	Driver ...	8 years	R and L.+0.50, oblique astigmatism	Marked rotatory	—
35	Miner ...	23 years	Slight hypermetropic astigmatism	Rotatory	Headache and vertigo.
46	Miner ...	30 years	+1.4 D. sphs. in both eyes	Rotatory	Marked vertigo and photophobia.
49	Miner ...	40 years	R.-1 D. cyl., axis 120°. L.-0.75 D. cyl. axis 60°	Slight	—
21	Miner ...	6 years	No error	Fine oscillation	Photophobia and nictitation
40	Miner ...	24 years	R.-0.75 D. L.-1.25 D. Oblique cylinders	Rotatory	—
50	Miner ...	40 years	R.+6 D. L.+4 D., with slight oblique hypermetropic astigmatism in both eyes	Marked	Photophobia.
46	Miner ...	28 years	R.+1 D. horiz. cyl. L.+1 D. obliq. cyl.	Marked	Marked twitching of eyelids.
25	Miner ...	12 years	R.=Normal. L.-1 D.	Marked	Photophobia.

In this connexion it appears surprising that even in the most up-to-date collieries there is, as yet, no indication of electric light being used throughout the workings. We are satisfied that if such precautions were taken and electric light installed in all working places in collieries, or electric lamps capable of giving light for at least eight hours supplied to all underground workers, miner's nystagmus would soon be unknown, while serious accidents to workmen and consequent loss to employer would much more rarely occur.

Treatment.

The curative treatment may be summed up in a single sentence, "Rest, strychnine and the correction of refraction errors."

ANEURYSM OF THE ANTERIOR CUSP OF "THE MITRAL VALVE IN A CASE OF STAPHYLOCOCCAL ENDOCARDITIS.

BY

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T. L., aged 16 years, was admitted under me into the hospital on April 8th, 1912. He was an apprentice fitter, and stated that he had always been of good health till the onset of the present affection. There was no history of rheumatic fever. Six weeks before admission he complained of headache, palpitation, sickness, and pain in the infrasternal notch, and he was compelled to stop work.

On admission he looked pale and thin; his teeth were good, the tongue was furred, but otherwise the alimentary system was normal. There were fine and medium râles at the base of both lungs. The urine showed some phosphates, no albumen, and no sugar. The left ventricle was hypertrophied, and a systolic

slight improvement. However, after the lapse of another week, when I was considering the advisability of a third dose, the embarrassment of the heart became more marked, the temperature fell, the pulse rose, his weakness increased, and he died on May 11th.

Post-mortem Examination.—The heart was found hypertrophied and weighed 17 oz. It was opened by a sterilized knife and a minute piece of the vegetation from the mitral valve removed and planted in broth; a staphylococcus was grown, but the growth became contaminated by the *Bacillus subtilis*. An abscess was found in the upper part of the spleen, which gave a pure staphylococcal growth. The right side of the heart was normal; in the left there was stenosis and thickening of the semilunar valves; there was a small growth of vegetations on the auricular surface of the left or posterior flap of the mitral orifice; the anterior or septal presented a large aneurysmal sac ballooned back into the auricle, no doubt from the greater pressure in the ventricle; the orifice of this aneurysm on the ventricular aspect was large enough to admit the tip of the little finger; the cavity was partially filled with blood clot.

Several interesting problems are suggested. Could

Stereoscopic photograph of aneurysm of the anterior cusp of the mitral valve in a case of staphylococcal endocarditis. (Taken by Messrs. Lizars.)

thrill was felt over the mitral area; there was some difference of opinion as to the presence of a presystolic thrill; a loud, blowing murmur was heard over the precordial area generally, perhaps loudest towards the base, but also conducted round into the left axilla; it masked or replaced the first sound in the mitral area. A diastolic murmur of feeble intensity, but of the ordinary character, was heard along the sternum and also in the mitral area, where its character was indefinite and rumbling; this murmur was diagnosed as a "Flint's." The pulse was regular, soft, and varied between 84 and 132; it was generally between 112 and 120. The temperature was 99° to 100° F. in the morning, 101° and 102° in the evening. The blood count a few days after admission gave 3,000,000 red and 14,000 white, haemoglobin 60 per cent., thus giving an index of 1.

Suspecting an infective endocarditis, I drew off 8 oz. of blood from a vein and obtained a pure culture of staphylococcus in broth, and from this in agar. Dr. Wilson, Queen's University, kindly made me a vaccine, and on April 24th I gave the patient 20 million; this upset him and was evidently too large, but he seemed somewhat better on the third day after the vaccine; the improvement was not continued. A week later I gave him 10 million; this slightly upset him, and again there seemed a

such hypertrophy take place in ten weeks in a lad poisoned with a staphylococcal toxin? Had there not evidently been some old-standing heart trouble? Again, the question of the entrance of the poison into the system is one of great difficulty and interest. Not very infrequently we meet with cases in which presumably a local infection becomes from some trivial cause generalized. Thus Dr. Henry of Belfast had treated a case of acne in a lad of about 20. He improved and relapsed. About a fortnight after the last dose of vaccine he fell while jumping, and two days afterwards developed pain in the region of the left hip. This condition got worse, and in a few days during which I saw him septicaemia set in, probably with endocarditis, which became intensified, and death ensued so rapidly that a full bacteriological examination of blood or spinal fluid could not be made. A *post-mortem* examination was not allowed. A somewhat similar result followed a slight wrench of the